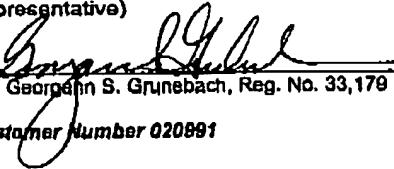
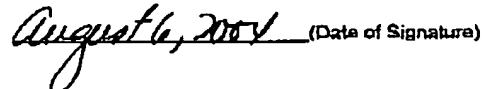


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August 6, 2004 (Date of Signature)

PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Stanislav I. Ionov

Serial No: 09/327,361

Group Art Unit: 2633

Filed: 06/05/1999

Examiner: Phan, Hanh

Title: ARCHITECTURE FOR AN OPTICAL SATELLITE
COMMUNICATION NETWORK

Attorney Docket No.: PD-970411

DECLARATION UNDER 37 C.F.R. 1.131

Mail Stop Amendment
Commissioner for Patents
Box 1450
Alexandria, VA 22313-1450

We, Stanislav I. Ionov, George C. Valley, and Anthony S. Acampora declare that:

1. We are the co-inventors of claims 1-32 of the above-identified patent application.
2. Prior to April 15, 1999, we conceived the idea of forming a satellite constellation using satellites with reconfigurable optical transmitters to form a rearrangeable satellite network. An invention disclosure was submitted to the Hughes patent department prior to April 15, 1999. A copy of the disclosure is submitted herewith as Exhibit "A." Table 1 and Figure 2 of the disclosure correspond to Figures 3 and 4 of the present application. Figure 1 of the disclosure is included in Figure 1 of the present application. The Hughes patent department received the disclosure prior to April 15, 1999.

3. On June 10, 1998, the disclosure was sent to outside counsel for the preparation of a patent application (Exhibit "B").

4. On September 24, 1998, I received a draft of the application for my review (Exhibit "C").

5. On November 18, 1998, the finalized application was sent by Mr. Mierzwa to the Hughes patent department for filing (Exhibit "D").

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME AND MAILING ADDRESS OF INVENTOR:	RESIDENCE	CITIZENSHIP	SIGNATURE	DATE
Stanislav I. Ionov 26025 Mulholland Hwy. Calabasas, CA 91302	Calabasas, CA	US		7/20/ 2004
George Valley 2827 Wigton Road Los Angeles, CA 90064	Los Angeles, CA	US	<hr/> <hr/>	
Anthony S. Acampora 6473 Avenida Cresta La Jolla, CA 92037-6514	La Jolla, CA	US	<hr/> <hr/>	

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NAME AND MAILING ADDRESS OF INVENTOR:	RESIDENCE	CITIZENSHIP	SIGNATURE	DATE
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George Valley 2827 Wiglown Road Los Angeles, CA 90064	Los Angeles, CA	US	<u>George C. Valley</u> <hr/>	<u>7/22/04</u> <hr/>
Anthony S. Acampora 8473 Avenida Cresta La Jolla, CA 92037-6514	La Jolla, CA	US	<hr/>	<hr/>

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NAME AND MAILING ADDRESS OF INVENTOR:	RESIDENCE	CITIZENSHIP	SIGNATURE	DATE
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George Valley 2827 Wigton Road Los Angeles, CA 90064	Los Angeles, CA	US	<hr/>	<hr/>
Anthony S. Acampora 6473 Avenida Cresta La Jolla, CA 92037-6514	La Jolla, CA	US	 8/3/04	8/3/04

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INVENTION DISCLOSURE

THIS INVENTION DISCLOSURE IS MADE
 PURSUANT TO MY / OUR INVENTION AGREEMENT
 WITH HUGHES AIRCRAFT COMPANY.

HUGHES**1. TITLE OF INVENTION**

SHEET 2 OF 7

A Ring Architecture of an Optical Satellite Network.

2. INVENTOR(S)

NAME	PAYROLL NO.	SOURCE CODE	LOC	BLDG	MS	PHONE	MANAGER
S.I. Ionov	J3227	30 50 20	MA	250	RL65	x5144	M.S. Mangir
G.C. Valley	52487	30 50 20	MA	250	RL64	x5435	H. Wang

3. PROOF OF CONCEPTION

A. BY WHOM WAS FIRST DESCRIPTION WRITTEN OR DRAWING MADE?	DATE	TIME SPENT	ACCT. CHARGED	LOCATION OF FIRST DESCRIPTION / DRAWING
S.I. Ionov	4/8/97	3 hours	cd17ad1lc	2054, file d:\projects\SetCommstamp.ppt
S.I. Ionov, G. Valley	6/6/97	4 hours	cd17ad1lc, cd17as14	T.J. #N1756, pp. 29-38.
B. TO WHOM WAS INVENTION FIRST DISCLOSED?	DATE			
M.B. Mangir	4/8/97			

4. REDUCTION TO PRACTICE

A. WAS A DEVICE EMBODYING THE INVENTION CONSTRUCTED AND TESTED OR THE PROCESS PRACTICED?	YES NO <input checked="" type="checkbox"/>	BY WHOM	DATE STARTED	DATE COMPLETED	TIME SPENT
B. ACCOUNT CHARGED -- TIME	ACCOUNT CHARGED -- MATERIAL	PRESENT LOCATION OF DEVICE			
C. PRESENT LOCATION OF DOCUMENTS (DATE SIGNED AND WITNESSED), INCLUDING PHOTOS, DRAWINGS, AND DATA SHEETS SHOWING REDUCTION TO PRACTICE					

NOTE: ALL EVIDENCE OF CONCEPTION (FIRST DRAWING AND FIRST WRITTEN DESCRIPTION) AND EVIDENCE OF REDUCTION TO PRACTICE (DEVICE EMBODYING THE INVENTION AND TEST DATA) MUST BE RETAINED.

5. RELATION TO GOVERNMENT CONTRACT

A. DOES THIS INVENTION RELATED TO WORK PERFORMED UNDER A GOVERNMENT CONTRACT?	YES NO <input checked="" type="checkbox"/>	CONTRACT NUMBER AND TITLE		
B. IS INVENTION BEING USED ON A GOVERNMENT CONTRACT?	YES NO <input checked="" type="checkbox"/>	CONTRACT NUMBER AND TITLE		

6. RELATED DOCUMENTS AND DISCLOSURE (BY YOU OR BY ANOTHER). PLEASE ATTACH COPY.

A. IS THERE A PUBLICATION OR PUBLIC PRESENTATION RELATED TO THE INVENTION?	YES NO <input checked="" type="checkbox"/>	DATE	IDENTIFY
B. ARE THERE ANY RELATED INVENTION DISCLOSURES OR PATENT APPLICATIONS?	YES NO <input checked="" type="checkbox"/>	DATE	IDENTIFY PD NO. ETC.
C. ARE THERE ANY PROPOSALS OR REPORTS OR OTHER DOCUMENTS RELATING TO THIS INVENTION	YES NO <input checked="" type="checkbox"/>	DATE	IDENTIFY
D. HAS THE INVENTION BEEN USED, DISCUSSED, DEMONSTRATED OR OTHERWISE DISCLOSED OUTSIDE THE COMPANY (SUCH AS TO A VENDOR OR CUSTOMER)?	YES NO <input checked="" type="checkbox"/>	DATE	TO / FOR WHOM (COMPANY / PERSON)

7. SALE

A. HAS PRODUCT EMBODYING INVENTION OR MADE BY INVENTION BEEN PROPOSED, SOLD, OR OFFERED FOR SALE?	YES NO <input checked="" type="checkbox"/>	ORDER NO.	ORDER DATE	DELIVERY DATE	DATE OFFERED OR PROPOSED
B. IS PRODUCT EMBODYING INVENTION OR MADE BY INVENTION IN A DELIVERABLE ITEM?	YES NO <input checked="" type="checkbox"/>	DELIVERY DATE			

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Ronald Jener 7/15/97

SIGNATURE INVENTOR

B.C. Valley 7/15/97

DATE

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INVENTION DISCLOSURE

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SHEET 4 OF 7

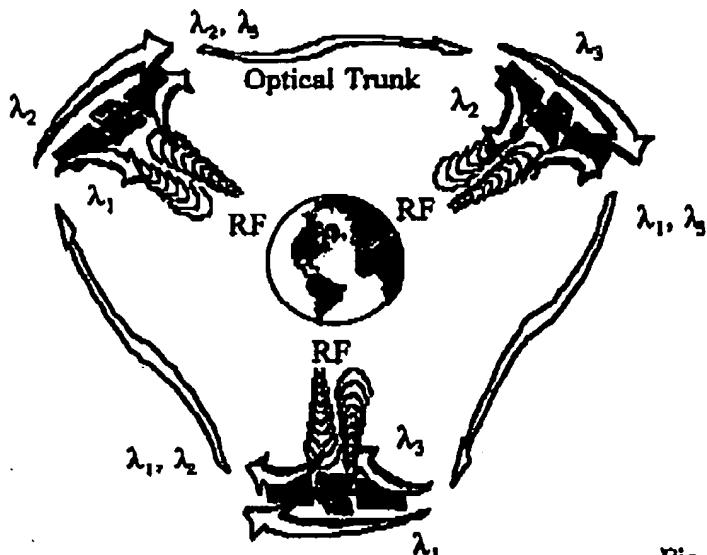


Fig 1

The information incoming from RF up-links is modulated onto optical carriers. In the proposed architecture, each optical carrier frequency is assigned to a particular RF down-link channel. As shown below, this allows complete optical routing of all optical signals to their respective destinations without involving any electronics.

We illustrate the proposed architecture by using an ATM network as an example, though other techniques, e.g., ATM packets with forward error correction, TDMA or CDMA, may prove advantageous for satellite applications. Moreover, since all-optical routing does not involve electronics, it is completely transparent to the underlying protocols. As a result, multiple protocols can be used by different satellites and/or RF receivers within a single network.

A satellite node may be organized as shown in Fig. 2. Each node receives data streams via one or more optical channels and one or more RF channels. Accordingly, one or more RF and optical channels are used for transmitting the information out. For simplicity, only one pair of receiving and transmitting channels is shown for each RF and optical subsystem. Also omitted are details on RF and optical modulation/demodulation, error correction, RF and optical amplifiers, and pointing and tracking components.

In the example shown in Fig. 2, a down-link channel is assigned an optical carrier with wavelength λ₁. All λ₁-λₙ optical channels from the preceding satellite in the ring are received by a telescope, preamplified and sent to an optical demultiplexer. The latter is a dispersing device of any kind capable of resolving adjacent optical channels within system specifications. Such devices are commercially available for terrestrial communications links. For example, a fiber WDM, Mach-Zehnder add/drop optical filter or a waveguide grating router may be chosen if the on-board optical bus is based on optical fiber. Alternatively, bulk dispersive elements may be employed. The demultiplexer drops the designated carrier from the optical bus so that there is only a negligible amount of power left at λ₁ in the optical bus. The latter restriction is important for preventing the interference from the unfiltered

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Howard Lewis 7/15/97 S. C. Valley 7/15/97

7/15/97
DATE

PATENT DOCKET NO.

READ AND UNDERSTOOD BY:

Kevin W. Kirby

Kevin W. Kirby

7/12/97

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JUL 16 1997

WITNESS NAME (TYPE)

Lisa R. Hamilton

Lisa R. Hamilton

7/12/97

DATE

7/12/97

DATE

2000 CS MAR 04

(EACH PAGE UPON WHICH INFORMATION IS ENTERED SHOULD BE SIGNED AND WITNESSED)

INVENTION DISCLOSURE

HUGHESSHEET 6 OF 7
Rev

signal that reaches the same satellite on its second round trip. The dropped optical channel is converted to an electronic signal via an optical receiver and directed to the corresponding RF down-link antenna. The remaining optical signals are transmitted intact along the optical bus.

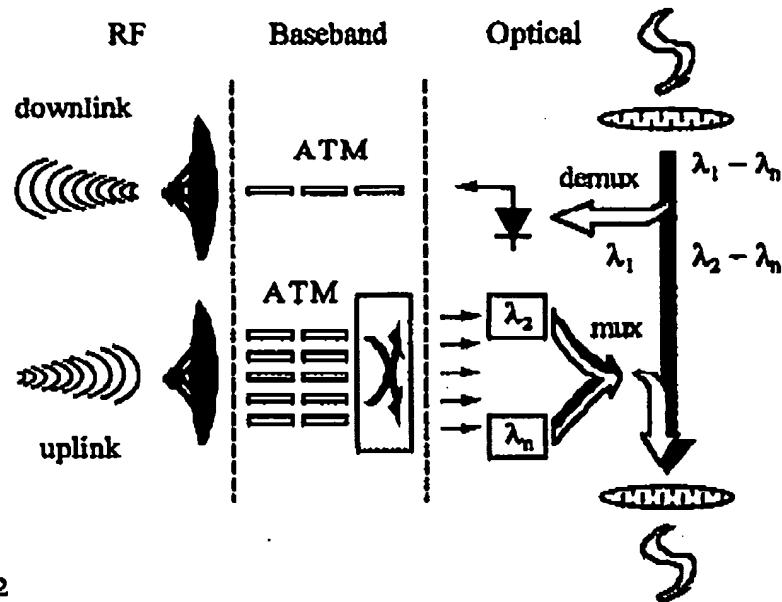


Fig. 2

In the RF receiving channel, radio signals from several antennas are down-converted to the baseband and the recovered streams of ATM packets are sent to an ATM switch. The latter reads the headers and sorts the packets according to their designated down-link channels. Some of these channels (not shown) are located on the same satellite. These are switched directly to their designated antennas. The other channels are modulated onto optical carriers whose frequencies have one-to-one correspondence with the destination RF down-links located on different satellites. These optical signals are multiplexed into the optical bus via passive elements. For example, star routers, 50x50 or 90x10 fiber couples may be used with optical buses based on a single mode fiber. The optical signal is amplified and sent to the transmitting telescope that points it to the next satellite in the ring.

In the described configuration, care must be taken for avoiding interference between data streams coming from the ATM switch and those already present on the same optical or RF down-link channels. These are avoided either actively by monitoring traffic on the network or passively by arranging traffic into frames and assigning each satellite its own time slot for transmission within each frame. The former approach offers more bandwidth with the burden of complicating the system, increasing power consumption and complicating network management. The latter approach sacrifices some of the bandwidth in favor of simpler architecture with reduced power consumption and simplified network management. Other passive approaches may be employed, e.g., CDMA coding with a distinct code word assigned to each transmitting satellite. The decision between passive and active approaches should be based on capacity considerations. It is quite possible that the passive approach is sufficient for many

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Standar Law 7/15/97 S. C. Valley 7/15/97
SIGNATURE INVENTOR

READ AND UNDERSTOOD BY:

Kevin W. Kirby
WITNESS NAME /TYPE*Lisa R. Hamilton*
WITNESS NAME /TYPE

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INVENTION DISCLOSURE

HUGHES

SHEET 8 OF 6

applications since anticipated capacities of optical links, 1-100 Gb/s, far exceed those of RF channels, i.e., ~100 Mb/s.

All optical routing provides a number of advantages over electronic switching. Those include (i) increased network capacity, (ii) transparency, (iii) simplified network management with the added benefits of (iv) reduced size, weight and power. (i) The increased capacity derives directly from the simultaneous use of multiple optical channels. The capacity of an individual optical channel is limited by the speed of attached electronics, which currently does not exceed ~ 20 Gb/s. By using multiple optical channels, the capacity is increased by the number of available frequencies. Commercially available fiber WDM and waveguide grating routers have up to 82 optical channels and this number approaches 128 for fiber-coupled grating monochromators. Furthermore, the number of channels may be doubled by exploiting left and right circular polarizations. Polarization multiplexing and demultiplexing can be done with fiber based and bulk optical components that are commercially available. It is also worthwhile emphasizing that the multi-wavelength architecture provides a seamless way for combining slow data stream from RF channels into a high data rate network without using state-of-the-art high-speed electronics. (ii) All-optical routing makes the network transparent to the protocols used at the baseband level. For example, one can make a network with some satellites transmitting and receiving ATM packets, whereas others use TDMA or CDMA access techniques. Since the network does not use electronic routing, optical traffic is routed seamlessly by intermediate nodes, which may use different protocols at the baseband level. (iii) The network management is simplified considerably. In fact, no traffic control is required if the passive approach is used for avoiding interference between incoming traffic and that already present on the network. (iv) Power consumption is expected to be reduced considerably since only passive elements are used for routing. Additional power may be required to compensate mux/demux optical losses. This, however, should be done with optical preamplifiers that do not consume much power, typically under 1 W. As a result of reduced power consumption, the system weight should be reduced also.

All-optical routing retains its advantages over electronic routing even when the number of down-link channels exceeds the number of available optical carriers. In this case, a group of transmitting RF antennas located on the same satellite are assigned one optical channel. Data streams are routed all-optically to this group of antennas where additional electronics is employed to direct them to the correct down-link. In fact, the same ATM switch that receives and routes data from RF up-links may be used for this purpose. Though this puts more burden on the electronics, final routing is performed on a single optical carrier that has been demultiplexed from the optical trunk. As a result, slower electronics is required with an added benefit of lower power consumption and weight. The network still enjoys higher capacity that is improved by the number of available optical carriers. Since high data rate routing at intermediate nodes is performed optically, network transparency is retained and network management is simplified.

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Boandar Lewis 7/15/97 B. C. Valley 7/15/97

SIGNATURE INVENTOR

7/12/97
DATE

READ AND UNDERSTOOD BY:

Kevin W. Kirby

WITNESS NAME (TYPE)

LISA R HAMILTON

WITNESS NAME (TYPE)

SIGNATURE

7/12/97
DATE

SIGNATURE

7/12/97
DATE

PATENT DOCKET NO.

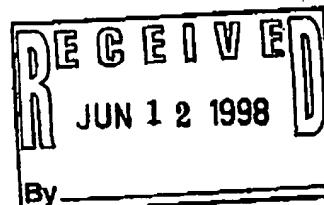
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Georgann Grunebach Senior Patent Counsel**HUGHES**SPACE & COMMUNICATIONS
A HUGHES ELECTRONICS COMPANYSC/B10/B327
Telephone (310) 662-8912
Facsimile (310) 384-6268

June 10, 1998

John A. Artz, Esq.
Lyon & Artz
28333 Telegraph Road
Southfield, MI 48034



Re: PD-970411
Title: Non-blocking Output Queue Architecture for an Optical Satellite Network
Inventor(s): S. I. Ionov, (310) 317-5144
G. C. Valley
A. S. Acampora (Consultant)

Dear John:

Please provide us with an estimate of your charges for preparing a patent application based upon the invention disclosure listed above, a copy of which is enclosed. The disclosure contains information that is considered to be Hughes proprietary, please treat it accordingly.

Please provide a draft application within 8 weeks, and the final version approved by the inventors not later than 90 days from the date of this letter (final version approximately September 2, 1998). Please contact the inventor(s) immediately for consultation, and if you foresee any problem or difficulty in meeting our desired due date, let us know right away.

We attach to this letter a checklist of specific items to be included with your estimate. Please complete this checklist and fax to me as soon as you are able to review the enclosed materials. If you are unable to supply or support any of these checklist items, address the issue in your estimate letter.

Hughes Space and Communications Company
P.O. Box 92919
Los Angeles, CA 90009

FAX "B"

John Artz, Esq.
Page 2

Specifically, your estimate should include all anticipated fees and disbursements (not including filing fees) for preparation of an application ready for filing in the United States Patent and Trademark Office. Your estimate shall be based on a flat rate per case. We will prepare the formal papers, obtain inventor signatures and file the completed application.

Please include the cost of formal drawings and three sets of reproducing masters in your estimate. Your bill will not be paid until acceptable formal drawings are approved. To be acceptable, drawings must be legible, and must be accompanied by a list identifying the name of the element and its callout number. The material composition must be specified for all cross-sectioned elements.

The attached disclosure may be incomplete or additional embodiments may have been developed since its generation. Your estimate should include at least one interview with the inventor(s).

If we accept your estimate and authorize you to prepare this application, you should submit all correspondence, including invoices with the following information:

1. The Hughes Docket Number PD-XXXXXX, title of the case, inventor name and name of the responsible Hughes attorney.
2. Itemized expenses rendered either on a per hour basis or flat rate for services plus a breakdown of costs and disbursements for postage, photocopying, telephone calls, travel and drafting.

Invoices are to be submitted upon completion of the application. No partial billing will be accepted. When forwarding any billing information to Hughes, send the original documents to the attention of:

Janet Bollinger
Hughes Electronics Corporation
Bldg. 001, M.S. A110
P.O. Box 956
El Segundo, CA 90245-0956

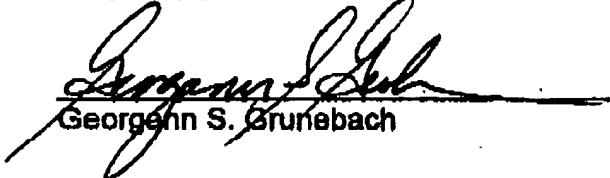
John Artz, Esq.
Page 3

To facilitate our filing of the United States patent application, please provide the application on A4 paper with an accompanying 3.5" diskette. Designate on the diskette the word processing program used to generate the patent application. We also require two sets of claims. The first set should be drafted for submittal to the United States Patent Office. The second set (for foreign filing) should not use "means" type claims, should include reference numerals within parentheses, multiple dependencies, and should include one independent method and one independent apparatus claim, if appropriate. Please try to limit the total number of claims of this second set to 10 claims or less if possible.

For your future reference, please do not include docket number(s) at the top of each page of the patent application. Also, please start the page numbering from the first page of the application, rather than the title page. Finally, the line numbering for the claims (in the left-hand margin) should be done individually for each claim. If you have any questions about our standard patent application format, please call me.

Do not hesitate to contact me with any questions regarding this matter. We look forward to working with you.

Very truly yours,



Georgenn S. Grunebach

GSG/dm

Enclosures: Invention Disclosure
Quotation Checklist

LYON & ARTZ PLC

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 John S. Artz
 Laurence C. Begin
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September 24, 1998

Mr. Stanislav I. Ionov
 Hughes Space & Communications Company
 MA/250/RL65
 3011 Malibu Canyon Road
 Malibu, CA 90265

VIA FACSIMILE

Re: U.S. Patent Application for
 "Architecture For An Optical Satellite
 Communication Network"
 Your Ref: PD- 970411
Our File: H 1034 PA

Dear Mr. Ionov:

Enclosed is a draft of the subject patent application including informal copies of the drawings. Please review all of the documents with your co-inventors (listed on the cover sheet of the patent application) to make sure they fully and accurately disclose and claim the invention. Let me have all of your comments on the application either by phone, fax or mail.

As you know, a patent application must set forth the best mode of the invention known to the inventor(s) at the time it is filed. Thus, if you or the other inventors have any additions or changes to the subject matter of the invention (including the drawing figures) in order to meet this requirement, the application should be amended accordingly. Also, if you have any additional or alternate embodiments or features of the invention, they should be added at this time.

We look forward to your response.

Very truly yours,

Kevin G. Mierzwa

KGM/kk
 Enclosures

cc: Georgann S. Grunebach, Esq. (w/encl., via First Class Mail)

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 (Call for delivery schedule. See back for detailed descriptions of freight services.)

C Packaging FedEx FedEx FedEx FedEx FedEx
 (Preferred value limit \$200)

D Special Handling (One box must be checked)
 Does this shipment contain dangerous goods? No Yes Other
 Dry Ice Air Waybill Cargo Airbill Only
 (Dry Ice & Air Waybill)

E Payment
 DR Sender Recipient Third Party Credit Card Cash
 (Enter FedEx Account No. or Credit Card Info. Below)

FedEx
 Account No. _____
 Credit
 Card No. _____ Exp. Date _____

Total Packages Total Weight Total Declared Value Total Charges
 1 00 00 00 **00** **00** **00**

*When declaring a value higher than \$100 per shipment, you pay an additional charge. See Shipping Instructions. EXCLUDED VALUES: AIR MAIL LETTER RATES AND AIR MAIL

F Release Signature Sign to authorize delivery without obtaining signature.
 Your signature authorizes Federal Express to deliver this shipment without obtaining a signature and agrees to indemnify and hold harmless Federal Express from any resulting claims.

321

See Order #888
 6100-001 FedEx
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 02/04/2004

EX. "D"

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Re: U.S. Patent Application for
"Architecture For An Optical Satellite
Communication Network"
Your Ref: PD-970411
Our File: H 1034 PA

Dear Ms.Grunebach:

Enclosed please find the final draft of the above-identified patent application incorporating the comments and suggestions received from the inventor. As you requested, we have also enclosed:

- Two sets of claims (one with reference numerals),
- One copy of the Specification on A4 paper,
- A 3.5" diskette containing the patent application (Word format),
- Formal drawings prepared on bristol boards, plus 4 copies, and
- A separate Abstract containing reference numerals.

Georgann S. Grunebach, Esq.
November 18, 1998
Page 2

Please note that this application has been combined with PD-970659 (our Dkt. H 1028 PA). This is the last of the related cases to PD-980044 and PD-970363.

Should you have any additional changes, or any questions regarding this application, please do not hesitate to contact me directly.

Very truly yours,



KEVIN G. MIERZWA

KGM/kk
Enclosures

cc: Stanislas V. Ionov (w/encls., via First Class Mail)